

## JOSEPH SWEETMAN AMES

To commemorate the 25<sup>th</sup> anniversary of its first meeting, the NACA convened on 18 March 1940 in Washington, D.C. The meeting was largely ceremonial, to reflect on how well they had built their organization. "You are doing a great job," effused President Franklin Roosevelt. "You are one governmental agency that doesn't give me a headache."<sup>1</sup> The Committee transacted only one item of business. Two, perhaps, if you include naming a small committee to carry this notice to Joseph Sweetman Ames: "The aeronautical research laboratory, authorized by Act of Congress on August 9, 1939, and which is now under construction at Moffett Field, California, will be named in your honor and will be known as the "Ames Aeronautical Laboratory."<sup>2</sup>

Illness forced Ames to retire from the NACA months before, in October 1939, after 24 years of service. The NACA had become the world's greatest institution for aeronautical science largely because of Ames' dignified leadership and his devotion to basic research--two traits he had cultivated at the other great institution he helped build--The Johns Hopkins University.<sup>3</sup>

As to the trustees it is their absolute duty to accept any recommendation that comes to them from the faculty when proposed by the president. As for the president, his primary duty is to uphold the faculty. I refer to tenure of office, freedom of speech, morale, all that goes to make up the faculty.... The primary purpose in the life of a professor is to conduct his own investigations and lead his own scholarly life, and the more attention he can pay to that, the better it is for an institution.

J.S. Ames, Address before the American Association of University Professors (December 1929)

### Ames at Johns Hopkins University

Ames was born in Manchester, Vermont on 3 July 1864, into a long line of Yankee industrialists and educators. His uncle, from whom he took his middle name, was president of Union College. His father, a physician, moved Ames and his mother to Niles, Michigan but died in

1869. Ames' mother, a strong woman and devoted to literature, moved him to Faribault, Minnesota, to be part of the cultural community built amidst those rolling hills by the Protestant Episcopal Bishop Henry Benjamin Whipple. Ames was a star pupil at the Shattuck School, where he got the classical, humanist education that made his speaking and writing so clear, logical, and persuasive.

Ames recalled happening upon, at the age of 15, an article in a popular magazine that described the newly-founded Johns Hopkins University: "it possesses no history, claims no distinguished sons, has indeed hardly reached the dignity of alma mater," but it was dedicated to "raising the level of educational standards" through "original research."

Ames arrived at Hopkins as a freshman in 1883, and died as its president emeritus sixty years later. He spent only one year away: as a post-doctoral student visiting the great laboratories of Europe and attending the physics lectures of Hermann von Helmholtz in Berlin. In fact, Hopkins was modeled on the German ideal of education through research, seminars, and the progression from undergraduate to graduate studies. Hopkins was only three years old when Ames arrived, and had already stirred controversy among American colleges.

Ames gravitated toward the laboratory of Henry Rowland, a pioneering spectroscopist with a knack for professional organization. Ames was appointed assistant in 1888, took his Ph.D. in 1890, then quickly took on greater duties teaching physics and managing the lab. Ames was especially good at getting good work from his students. On Rowland's death in 1901, Ames officially became laboratory director. Ames' research used spectroscopy, a dramatic new tool for analyzing the composition of materials and, later, the structure of the atom. Ames attended the birth of astrophysics when he was invited by the Astronomical Director of the Naval Observatory to direct the spectroscopic work for a 1900 eclipse expedition.

Ames took teaching and administration seriously, and his own experimental program suffered. Yet he avidly followed the literature (he

always called himself a student of physics rather than a physicist) and thus always had insights to help his students overcome their experimental problems. As his lab expanded in scope, so did his teaching. In 1915 he crafted a three-year course (published as the textbook *General Physics*) that laid out the architecture of physics in a period of rapid change. Ames was among the first American physicists to risk their reputations by publicly defending Einstein's theory of relativity. All his life, Ames was perceived as being among the "younger generation" of physicists, because of his willingness to support fresh ideas. One such young man was Hugh L. Dryden, who in 1949 became the first Director of the NACA. Ames' lecture style was formal, complete, logical and clear. (His personal conversation likewise was kind-hearted and fair but business-like and blunt, the result, some speculate, of a lifelong effort to control a stammer.) Ames only stopped teaching in 1925 when named dean. He was named provost in 1926.

Ames was 65 years old when he became president of Hopkins, in 1929. Ames knew it would be a trying time. Hopkins was just moving into its new campus, built for \$4.2 million in the Homewood section of Baltimore, just as the Great Depression wiped out Hopkins' endowment. Ames saved the University from bankruptcy only by valiant appeals to the alumni. Ames also inherited fractious faculty debate over the Goodnow Plan, which threatened to sever Hopkins' traditional link between graduate research and undergraduate teaching. And Ames dealt with increasing disciplinary problems by creating a structure for students to discipline themselves. "No administrative officer could be more accessible and none could take greater pains to gain a sympathetic understanding of the problems of others," wrote a journalist on Ames' presidency. "These are valuable qualities in the administrator of so loose a confederacy as a university."<sup>4</sup>

When his wife died in 1931, Ames buried himself in work and community service. (Though he had always tried to "keep my fingers on the city's pulse without the patient knowing it.") He was elected a lay

member of the standing committee of the Protestant Episcopal Diocese of Baltimore, and continued to serve as president of the Baltimore Country Club. Since 1900 Ames had directed a series of public lectures in physics for Baltimore area teachers. He accepted appointment to the Baltimore school board in 1932, then led opposition to a 1935 state bill requiring anyone teaching in Maryland to take a loyalty oath. His reasoning was pragmatic. Hopkins hosted many eminent foreign scholars, and the bill "ignores the fact that scholarship is a world-wide affair." But Ames attacked the bill as a larger evil: "Patriotism need not be taught by law." The press called him a man of courage, veterans supported him, as did those who championed Maryland's traditional tolerance of beliefs. "I would select as the fundamental principle of Americanism," Ames said, "freedom of thought, freedom to express one's best conclusion as to what is truth." Maryland's governor vetoed the bill.

In his final commencement as Hopkins president, Ames told his students: "My hope is that you have learned or are learning a love of freedom of thought and are convinced that life is worth while only in such an atmosphere.... It is doubtful if you ever attain absolute truth, and it is certain that you will never know if you do attain it. This should, however, be your constant endeavor."<sup>5</sup>

Freedom of inquiry, and the responsibility that entails, are values Ames instilled into another institution he built: the National Advisory Committee on Aeronautics.

"When you were first appointed by President Wilson in 1915, very little was known about the science of aeronautics. To you and your colleagues were entrusted by law the supervision and direction of the problems of flight....The remarkable progress for many years in the improvement of the performance, efficiency, and safety of American aircraft, both military and commercial, has been due largely to your own inspiring leadership in the development of new research facilities and in the orderly prosecution of comprehensive research programs."

F.D. Roosevelt to J.S. Ames, 10 October 1939<sup>6</sup>

## **Ames in the NACA**

Ames was a founding member of NACA, appointed by Woodrow Wilson in 1915. His research management skills and zeal for public service probably led to his appointment. So did his proximity to Washington: all NACA members worked part-time, without compensation. Mostly, Ames was appointed to represent physics. As aeronautics struggled to become a science, many disciplines claimed aeronautics as theirs. Look at the problems of predicting how a solid body moves through air, Ames wrote. "These matters make up the subject of aeronautics; and in order to investigate them the same methods must be applied as in any department of physics.... When the physical facts are known, the engineer can design his aircraft, the constructor can make it, and the trained man can fly it; but the foundation stone is the store of knowledge obtained by the scientist."<sup>7</sup>

Ames leapt to the NACA's most challenging assignments. He chaired the Foreign Service Committee of the newly-founded National Research Council and, in 1917, toured Britain and France to study the organization of science in service of the war. Ames oversaw the NACA's patent cross-licensing plan--that allowed manufacturers to share technologies--and his unquestioned impartiality and integrity made it work. Ames expected the NACA to encourage engineering education. Older men sat on the NACA's nested hierarchy of committees, but mostly to facilitate the work and careers of younger men. He pressed universities to train more aerodynamicists, then structured NACA to give young engineers on-the-job training.

Ames gave the NACA its scientific "tunnel vision" then valiantly protected that portion of the burgeoning aircraft effort. Ames led a special committee on the NACA's postwar organization, fashioned a small but effective NACA central bureau, and urged the committee to voice a vision and program for research. The NACA focused on research rather than policy. The military services and, later, the Commerce Department decided what aircraft to buy and how to use them; the NACA helped

make better aircraft. And Ames decided that NACA research mattered most in aerodynamics. He championed the work of theorists like Max Munk. The extraordinary wind tunnels at Langley Aeronautical Laboratory reflected Ames' vision, as well as the faith Congress placed in him. The extraordinary work done there resulted in part from Ames' frequent visits, to assess and encourage the work of its young staff.

A quiet triumvirate made the NACA so effective. John Victory administered its offices and committee hierarchy. Engineer George Lewis, NACA director of aeronautical research, connected NACA work with the needs of the military and industry. And Ames travelled to Washington one day week, kept an eye on politics and made it known that the NACA was about science. "The quiet, conservative, methodical style of the Committee," wrote historian Alex Roland, "can be attributed in large measure to this gentle man."<sup>8</sup>

Ames became chairman of the NACA main committee in 1927. Two years later, he accepted the Collier Trophy on behalf of the NACA. He kept the NACA alive when Herbert Hoover tried to kill it and transfer its duties to industry. And, Ames urged funding for a second laboratory.

Ames accepted a nomination, by Air Minister Hermann Göring, to the Deutsche Akademie der Luftfahrtforschung. Ames then considered it an honor--many Americans did--and was surprised to learn about the Nazi's massive investment in aeronautical infrastructure, then six times larger than the NACA. Ames more fervently advocated an expansion of NACA facilities to prepare for war.

A stroke in May 1936 paralyzed the right side of his body so, at age 73, he retired to the garden office at his home on Charlecote Place in Guilford near Baltimore. He immediately resigned as chairman of the NACA executive committee and, in October 1937, resigned from the NACA main committee. But Ames grew concerned when Congress bogged down the NACA proposal for its Sunnyvale laboratory. In a well-reasoned letter to Clifton A. Woodrum of the appropriations committee, Ames asked why America should spend hundreds of millions of dollars on

second-best aircraft. "What makes the project emergency in character is the fact that Germany, because of her larger research organization, now has the ability to design, and actually has in service, aircraft of superior performance." Ames concluded with a rare, personal appeal:

"For nearly twenty years, I have been appearing before the Appropriations Committee. I have supported what at times appeared to be bold plans for development of research facilities in the United States. I have never supported a padded or extravagant estimate. I have never supported a project that the Congress refused to approve. And every such project has proved successful for its purpose. Now, through impairment of health I am nearing the end of my active career. I have served as a member of the National Advisory Committee on Aeronautics for nearly twenty-five years, without compensation. I ask nothing from my country in the way of reward. My compensation has been tremendous in the satisfaction that has come to me from the realization that the work of the National Advisory Committee for Aeronautics has been successful over a long period of years in enabling American manufacturers and designers to develop aircraft, military and commercial, superior in performance, efficiency, and safety to those produced by any other nation. Now, I regret to say, the picture is changed. I still, however, have faith in our ability, with your support and the support of Congress, to regain for America the leadership in scientific knowledge which will enable our designers and manufacturers again to produce superior aircraft."<sup>9</sup>

On 8 June 1944, once the administration building was complete, the NACA officially dedicated its new laboratory in Sunnyvale to Joseph Sweetman Ames. Ames had died a year before. He never stepped foot in the laboratory that bears his name. In a letter to William Durand, who led the dedication ceremony, Henry H. "Hap" Arnold called "Dr. Ames the great architect of aeronautical science... It is most appropriate that it should now be named the Ames Aeronautical Laboratory, for in this Laboratory, as in the hearts of airmen and aeronautical scientists, the memory of Joseph S. Ames will be enshrined as long as men shall fly."<sup>10</sup>

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<sup>1</sup> J.F. Victory to J.S. Ames, 25 April 1940 (File 3: Miscellany: Box 1: G5002: Maryland Historical Society).

<sup>2</sup> Edward Warner, Chairman, Committee on Notification to Joseph S. Ames, 17 April 1940 (File 5: Box 8: G5002: Maryland Historical Society).

<sup>3</sup> The best biography of Ames is by Henry Crew, "Biographical Memoir of Joseph S. Ames," *Biographical Memoirs: National Academy of Sciences* XXIII (1944) 181-201. A former student wrote a biography detailing Ames' faults as a person, teacher, and physicist; N. Ernest Dorsey, "Joseph Sweetman Ames, The Man," *American Journal of Physics* 12 (June 1944) 135-148; N. Ernest Dorsey, "Joseph S. Ames and Aeronautics," *Johns Hopkins University Alumni Magazine* XXXII (June 1944) 93-44; See also Lyman J. Briggs, "Obituary: Joseph Sweetman Ames," *Science* (30 July 1943) 100-101; "Dr. J.S. Ames Dies, Led Johns Hopkins," *New York Times* (25 June 1943) 17.

<sup>4</sup> P. Stewart Macaulay, "The President of Hopkins Retires," *The Baltimore Sun Magazine* (2 June 1935) (in vertical file #4, Special Collections, Milton S. Eisenhower Library, The Johns Hopkins University).

<sup>5</sup> J.S. Ames, "Commencement Address: June 11, 1935," *Johns Hopkins University Alumni Magazine* 24 (June 1935) 1-6.

<sup>6</sup> Franklin D. Roosevelt to Joseph S. Ames, 10 October 1939 (File 5: Box 8: G5002: Maryland Historical Society).

<sup>7</sup> Joseph S. Ames, "Aeronautic Research," *Journal of the Franklin Institute* (January 1922) 15-28.

<sup>8</sup> Alex Roland, *Model Research: The National Advisory Committee for Aeronautics, 1915-1958* (NASA SP-4103, 1985) 169.

<sup>9</sup> J.S. Ames to Clifton A. Woodrum, 27 March 1939 (File 004557, NASA HQ History Office.)

<sup>10</sup> Letter of Henry H. "Hap" Arnold to William F. Durand, 26 May 1944 (Archives II: RG255: E13: Box 1: Folder 1)